

TRACKABLE OPTICAL DISCS WITH CONCURRENTLY
READABLE NONOPERATIONAL FEATURES

Mark O. Worthington, et al.

Appl. No.: 09/311,329 Atty Docket: NAGACO.012CP1
REPLACEMENT SHEET

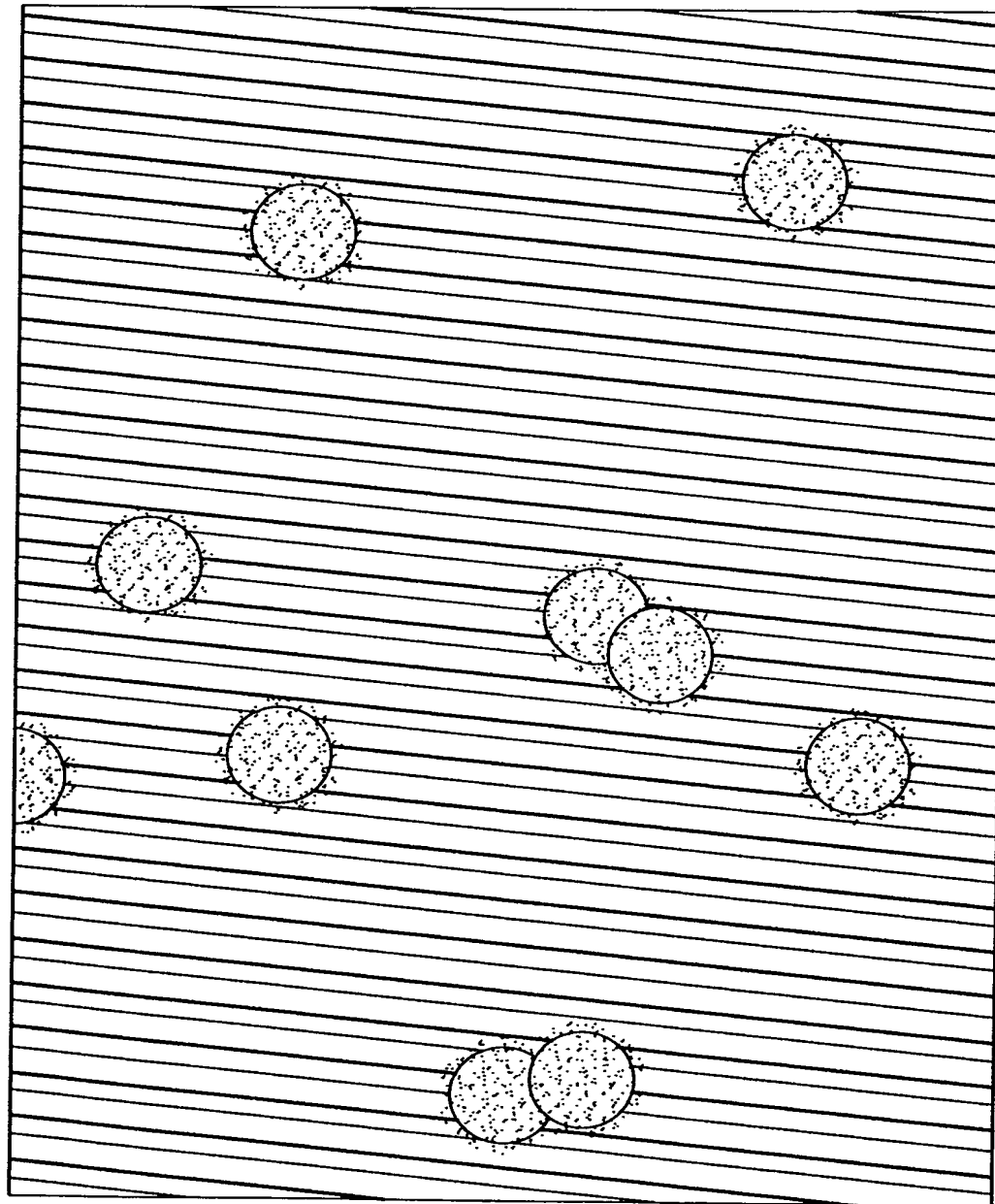


FIG. 8

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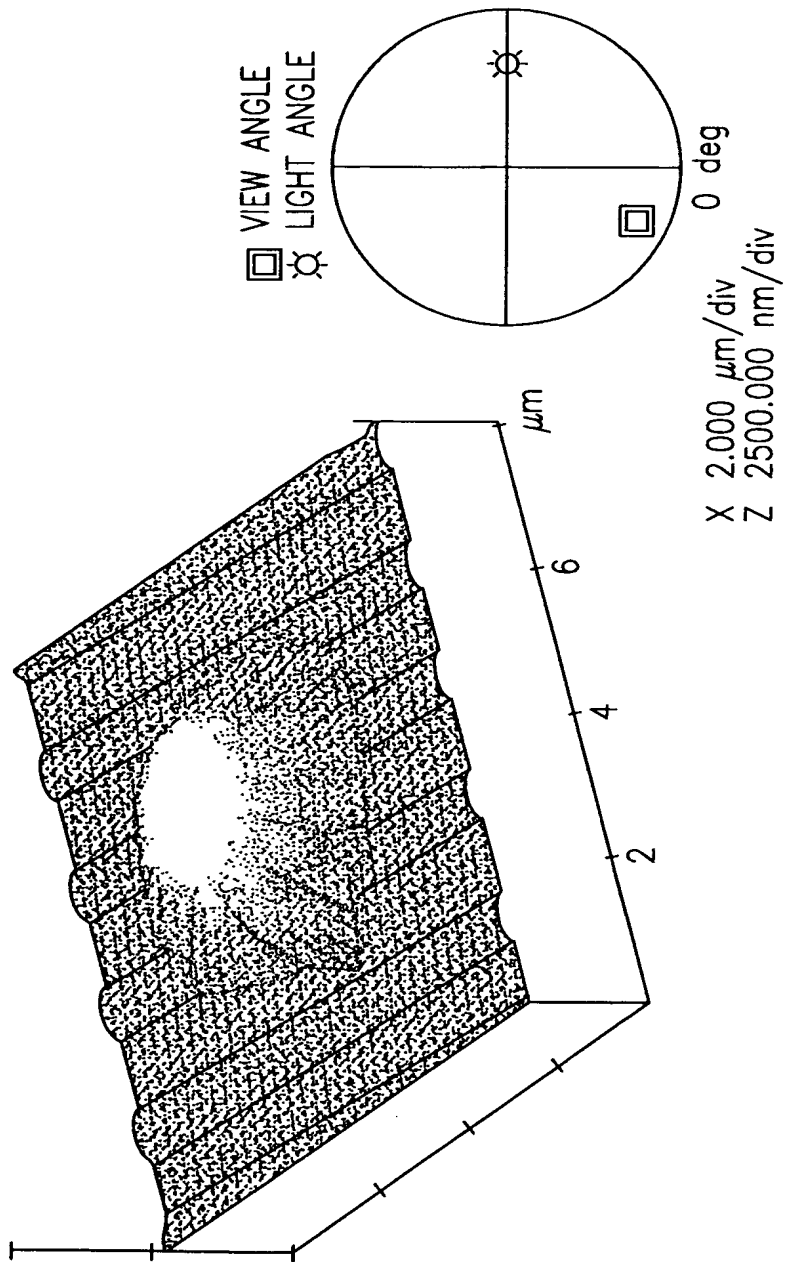


FIG.9

FIG.10

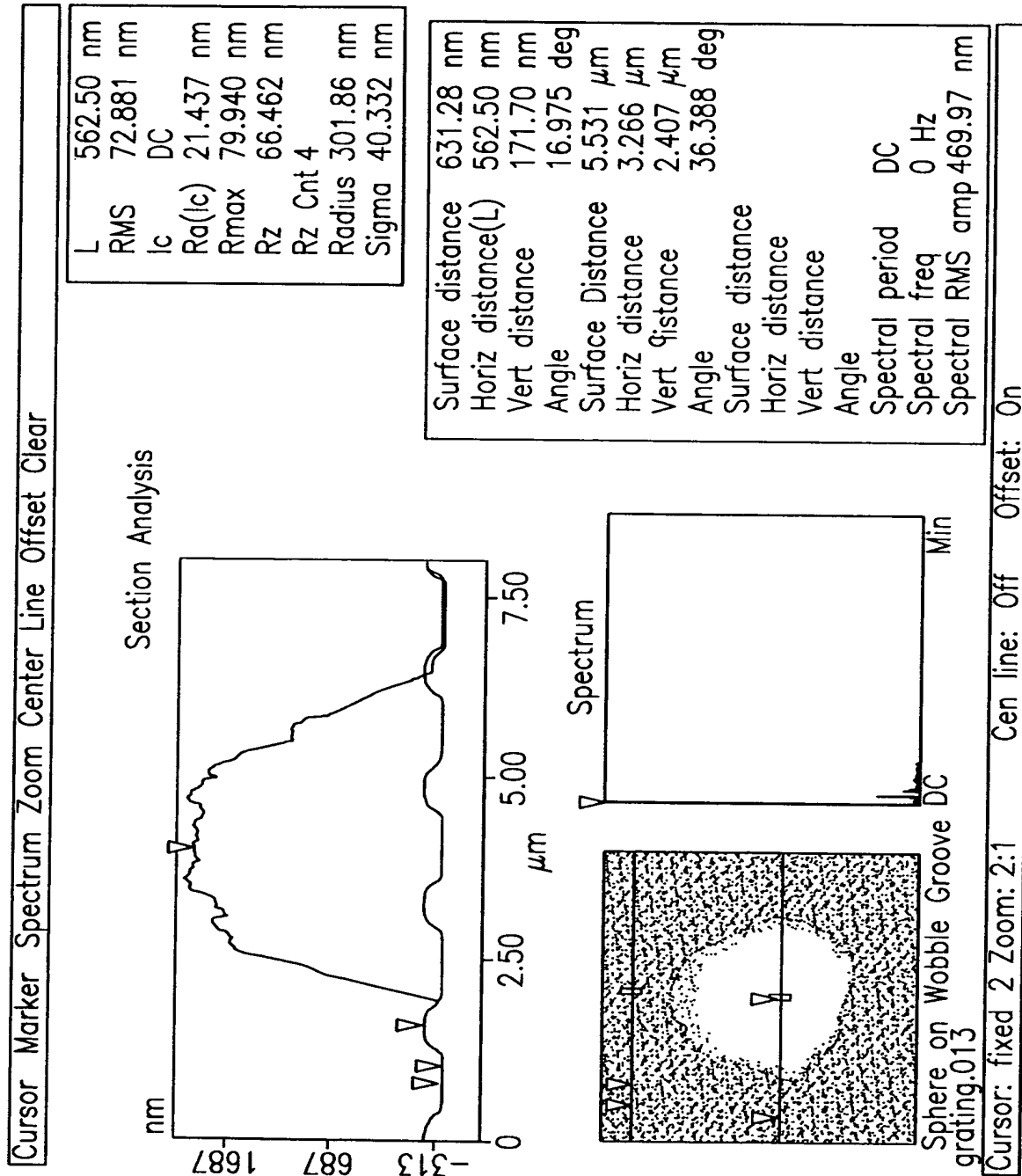


FIG. 11

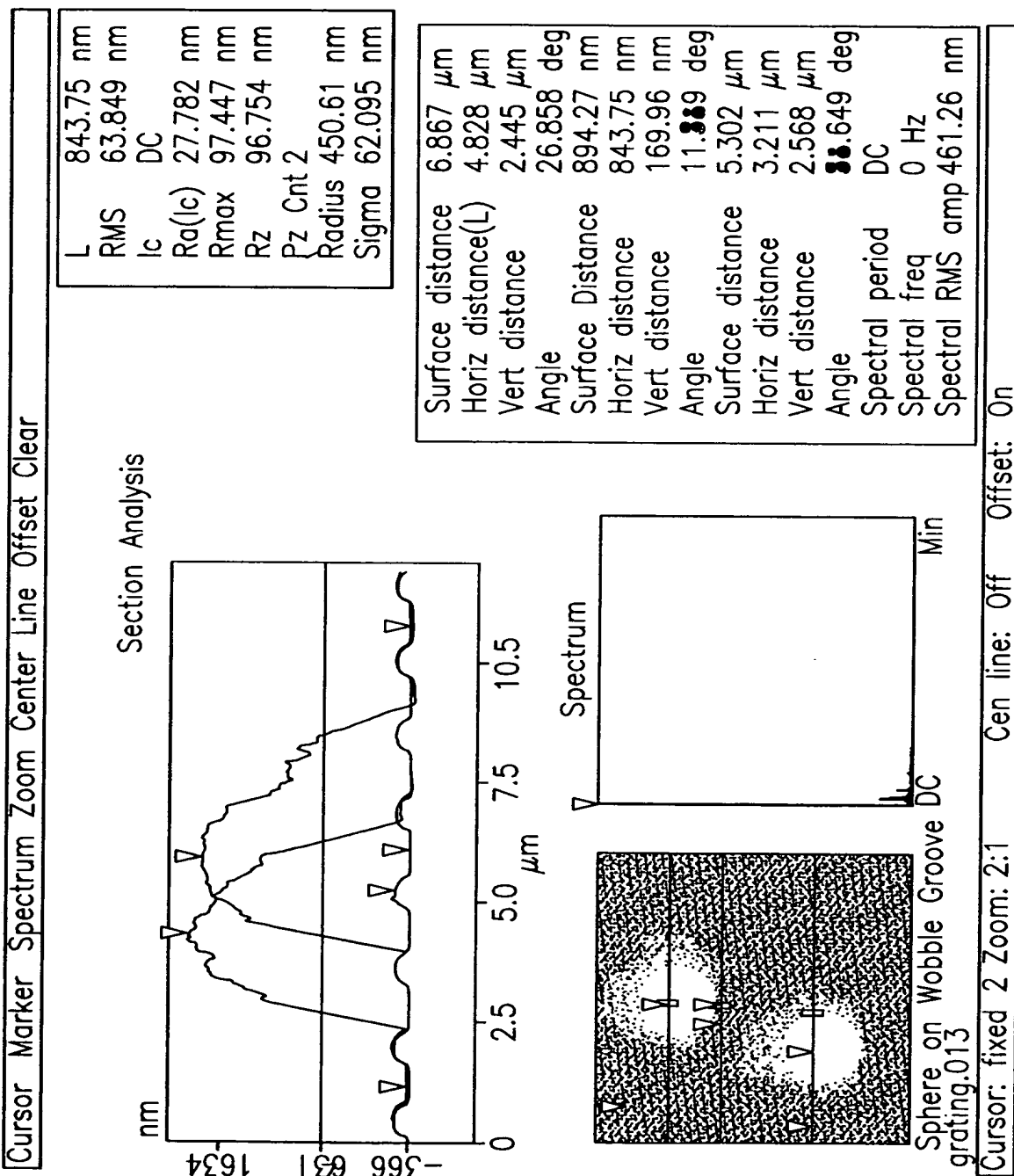


FIG.12

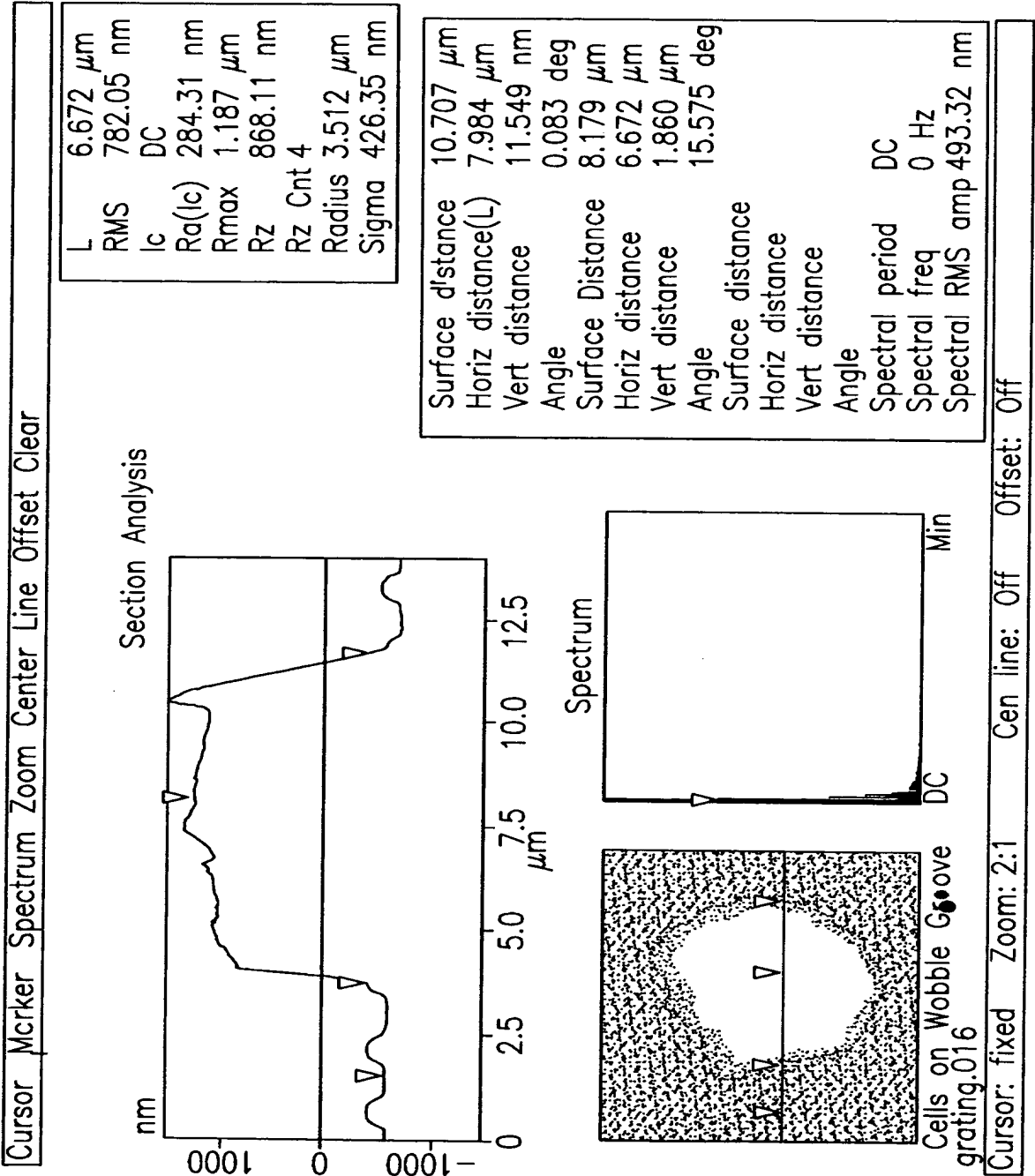


FIG.31

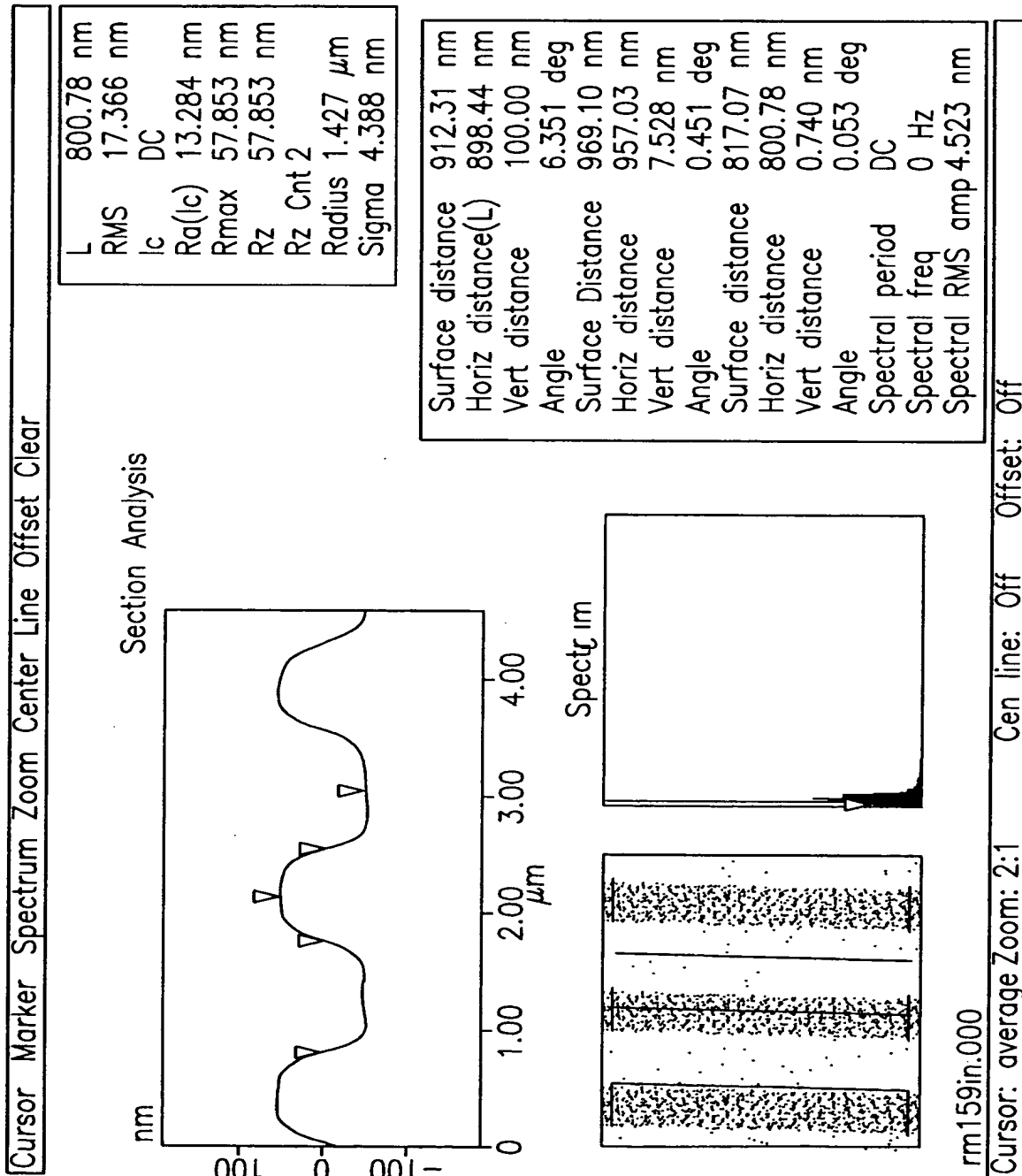


FIG.32

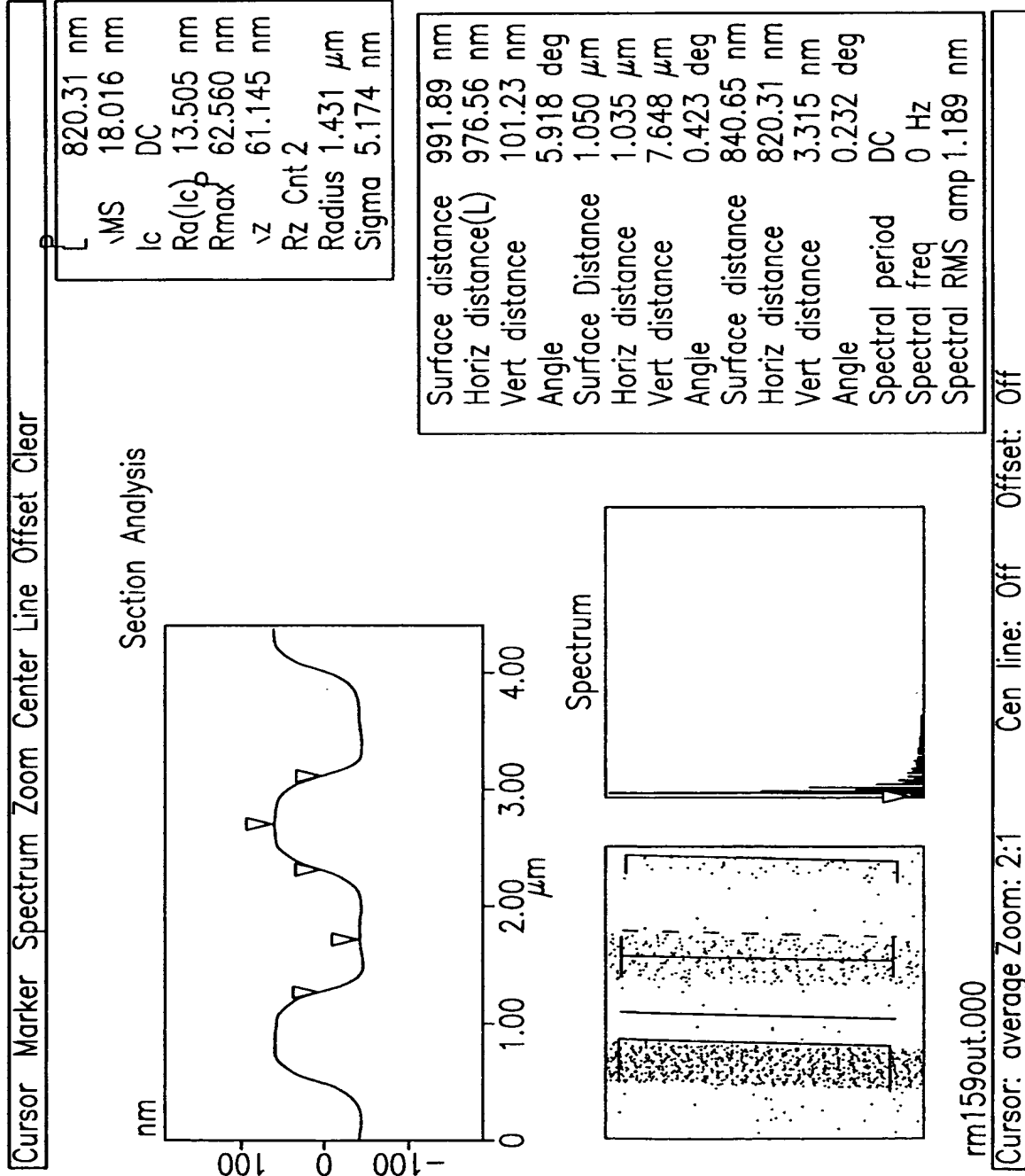


FIG.33

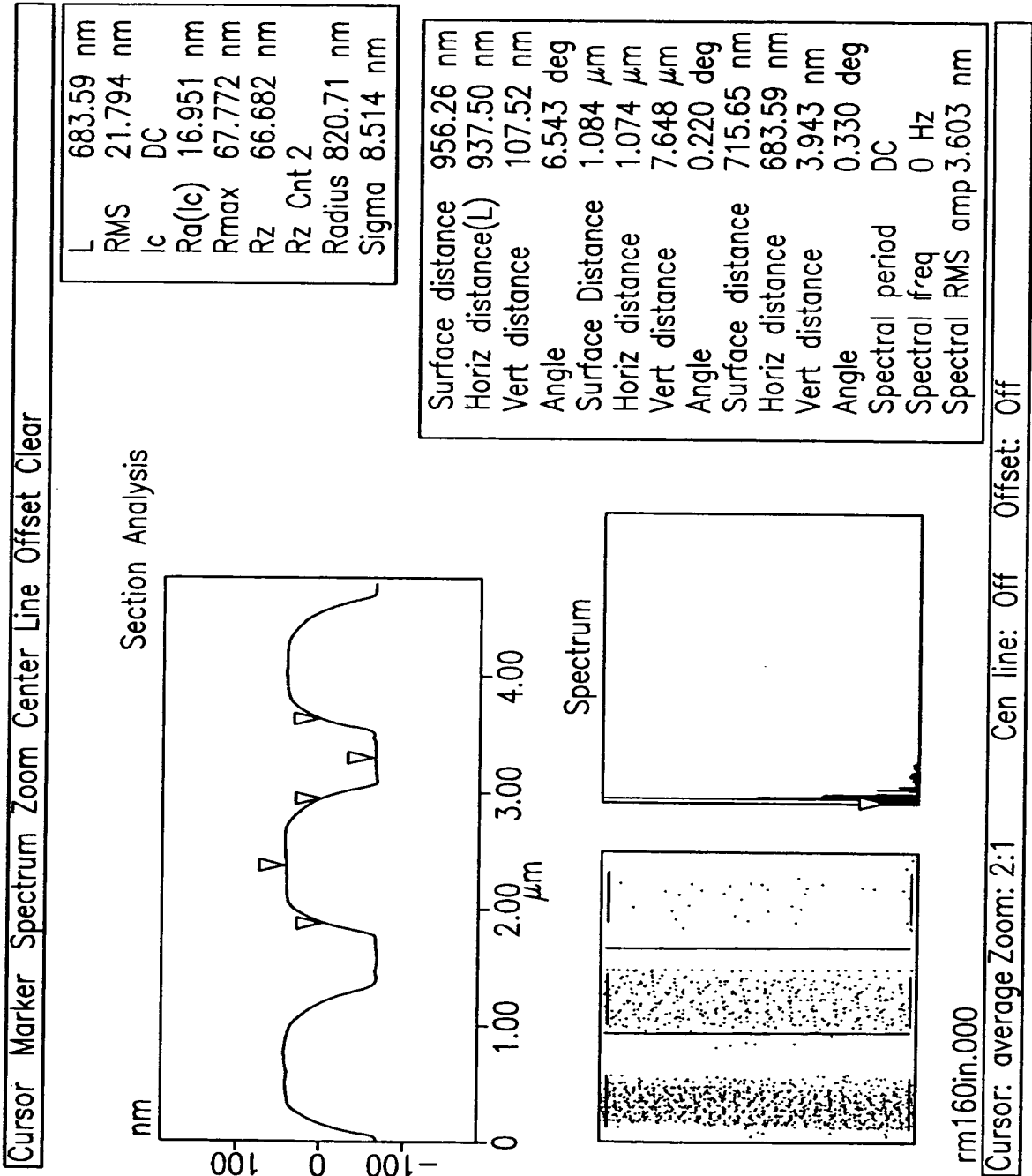


FIG.34

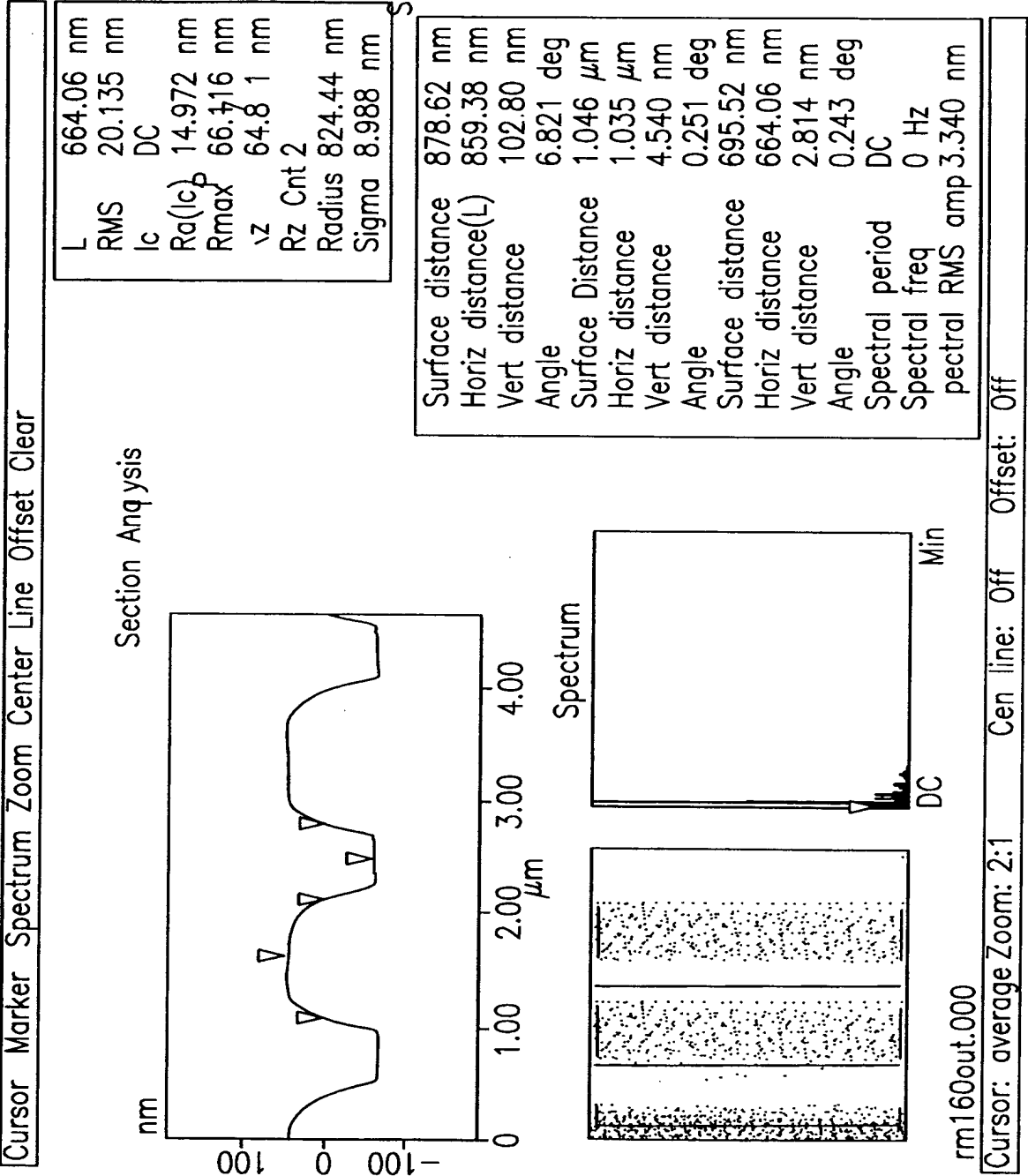


FIG.37A
20 femtomoles

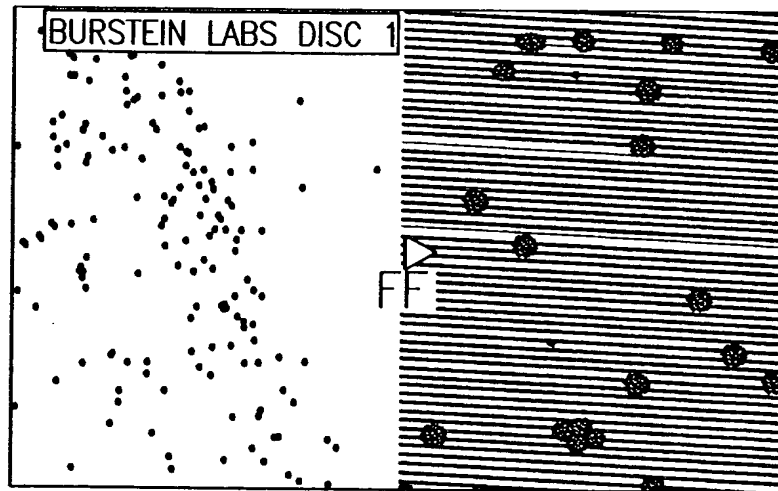


FIG.37B
20 attomoles

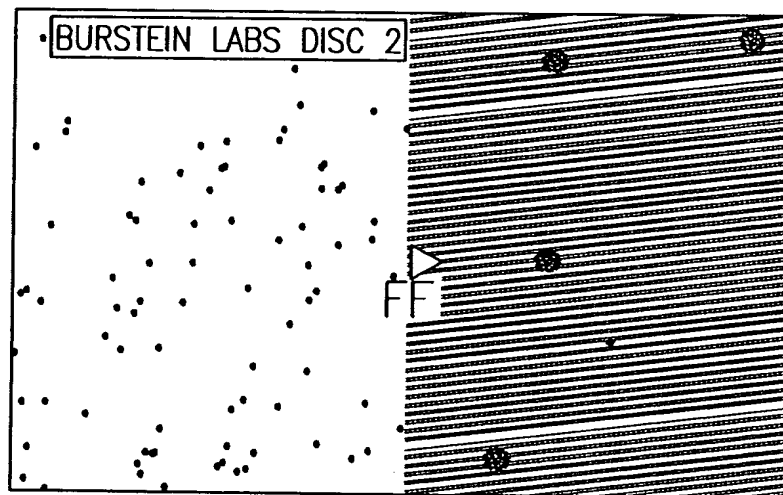
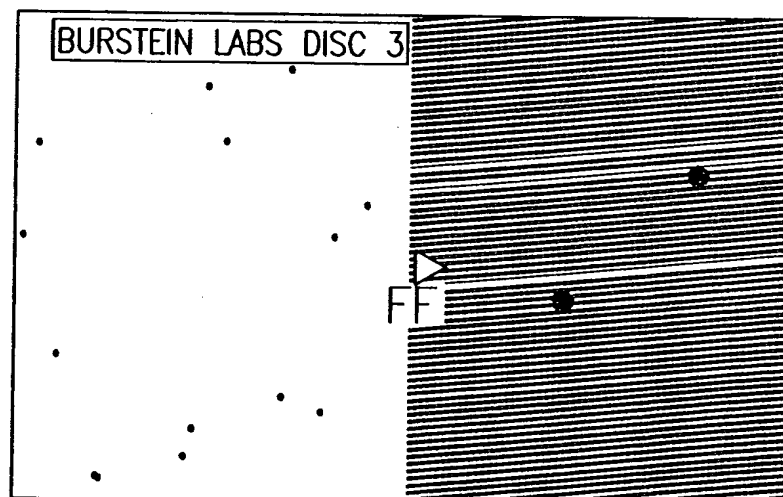


FIG.37C
20 zeptomoles



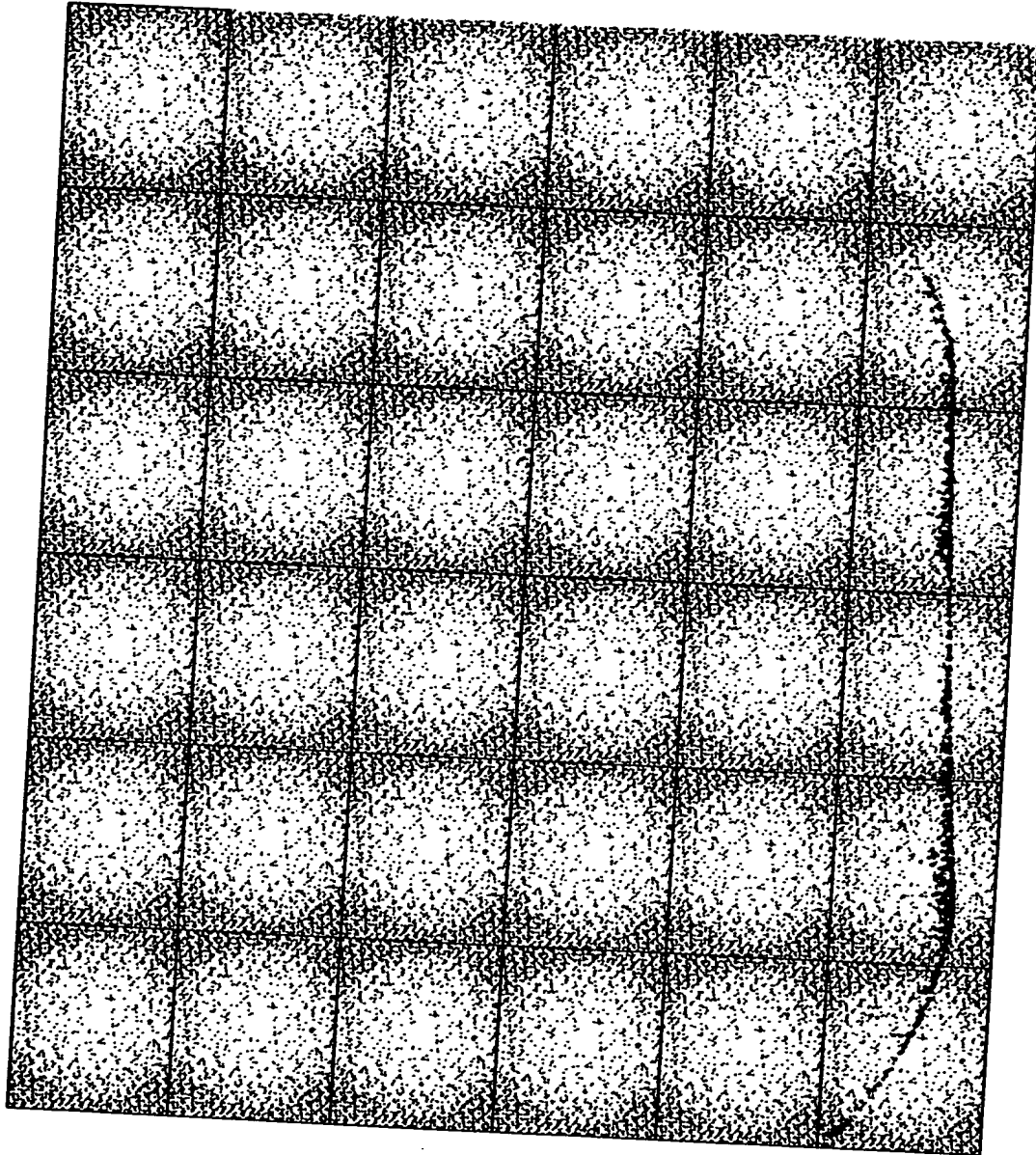


FIG. 38

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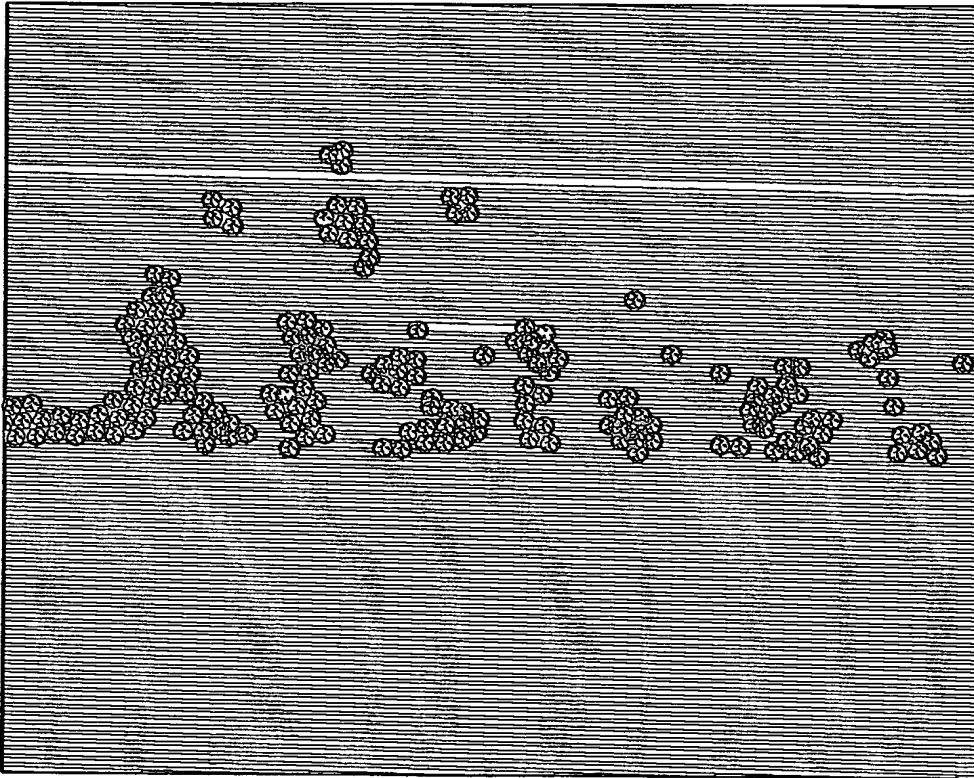


FIG.39

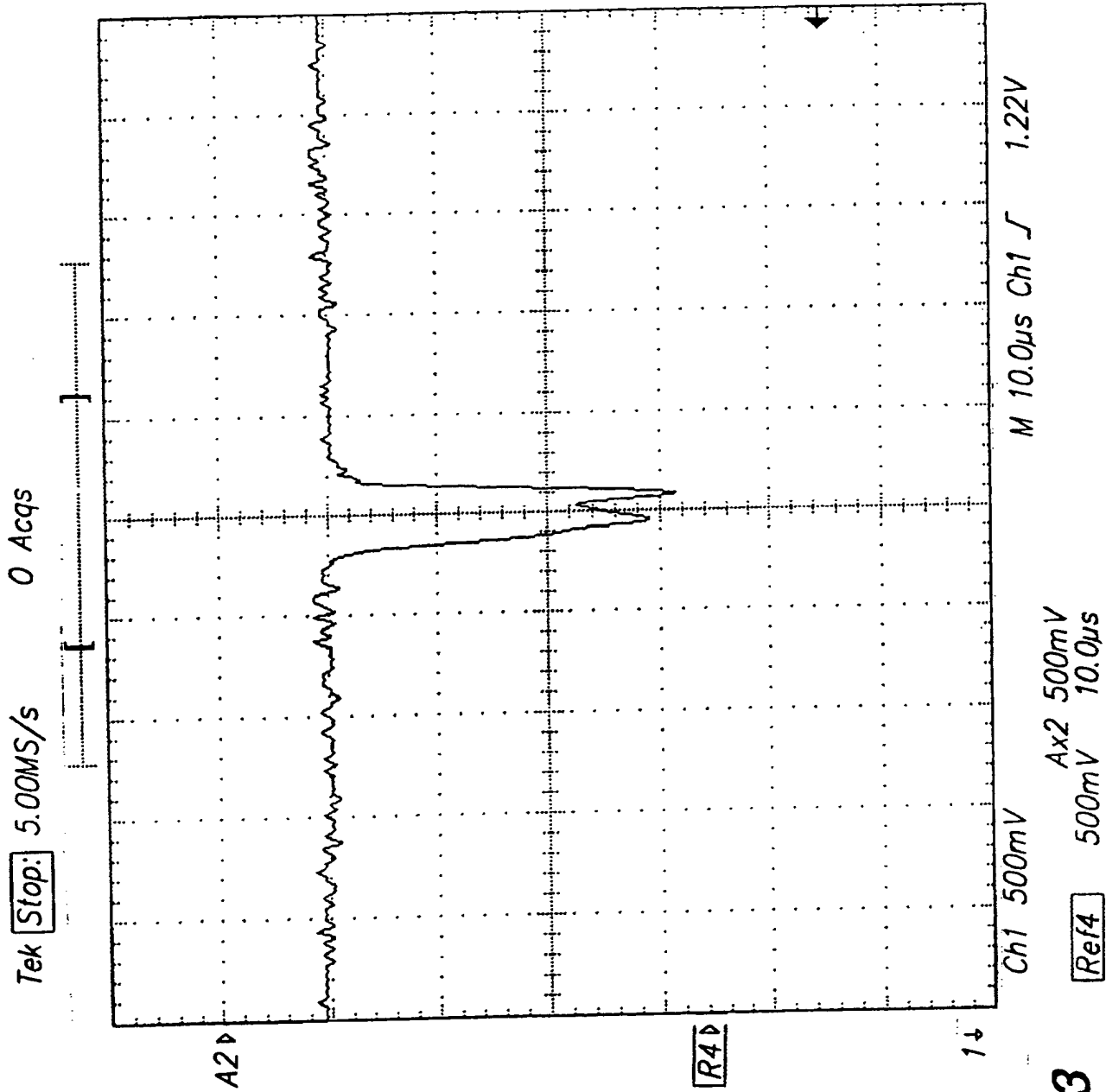


FIG. 13

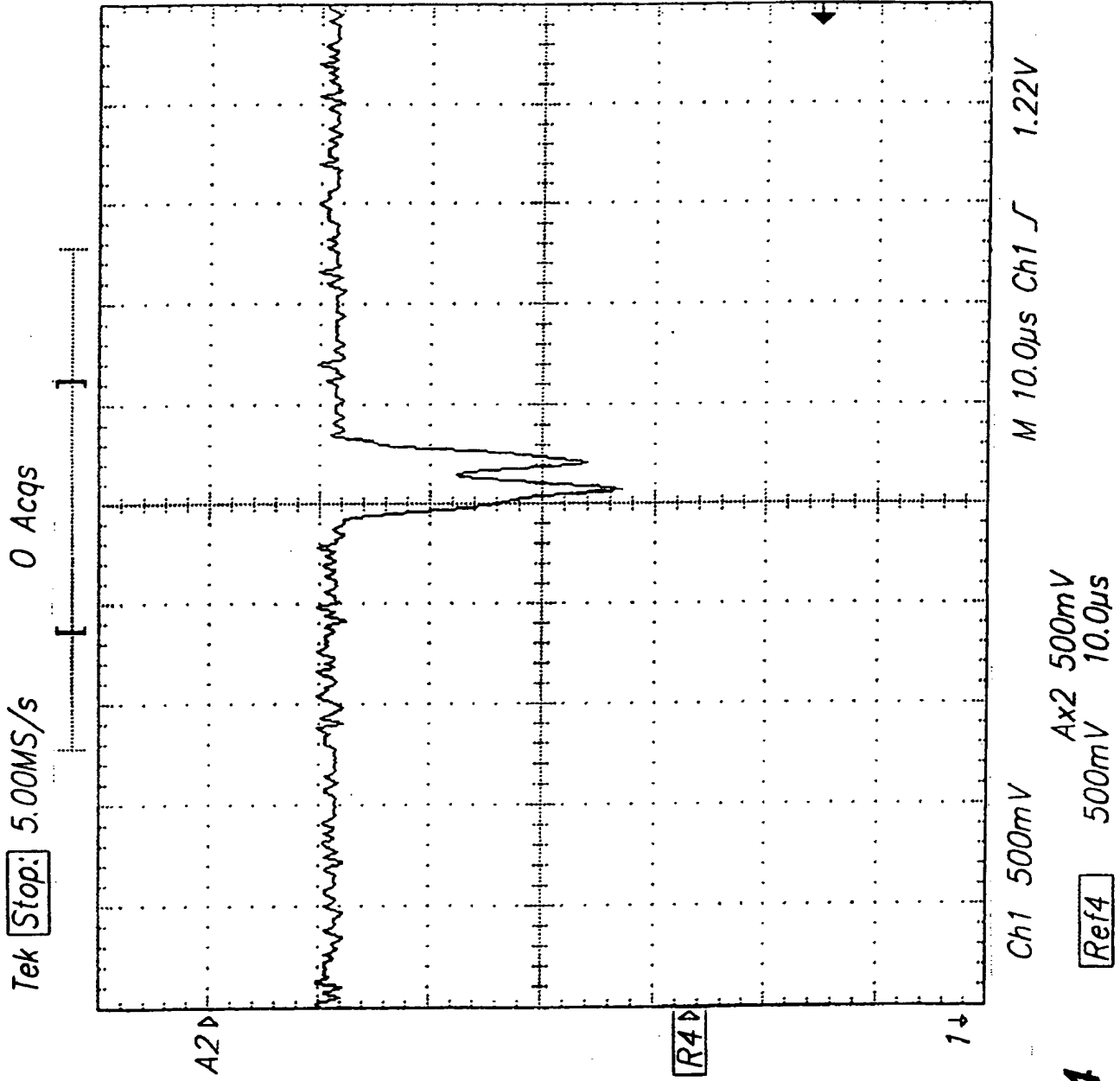
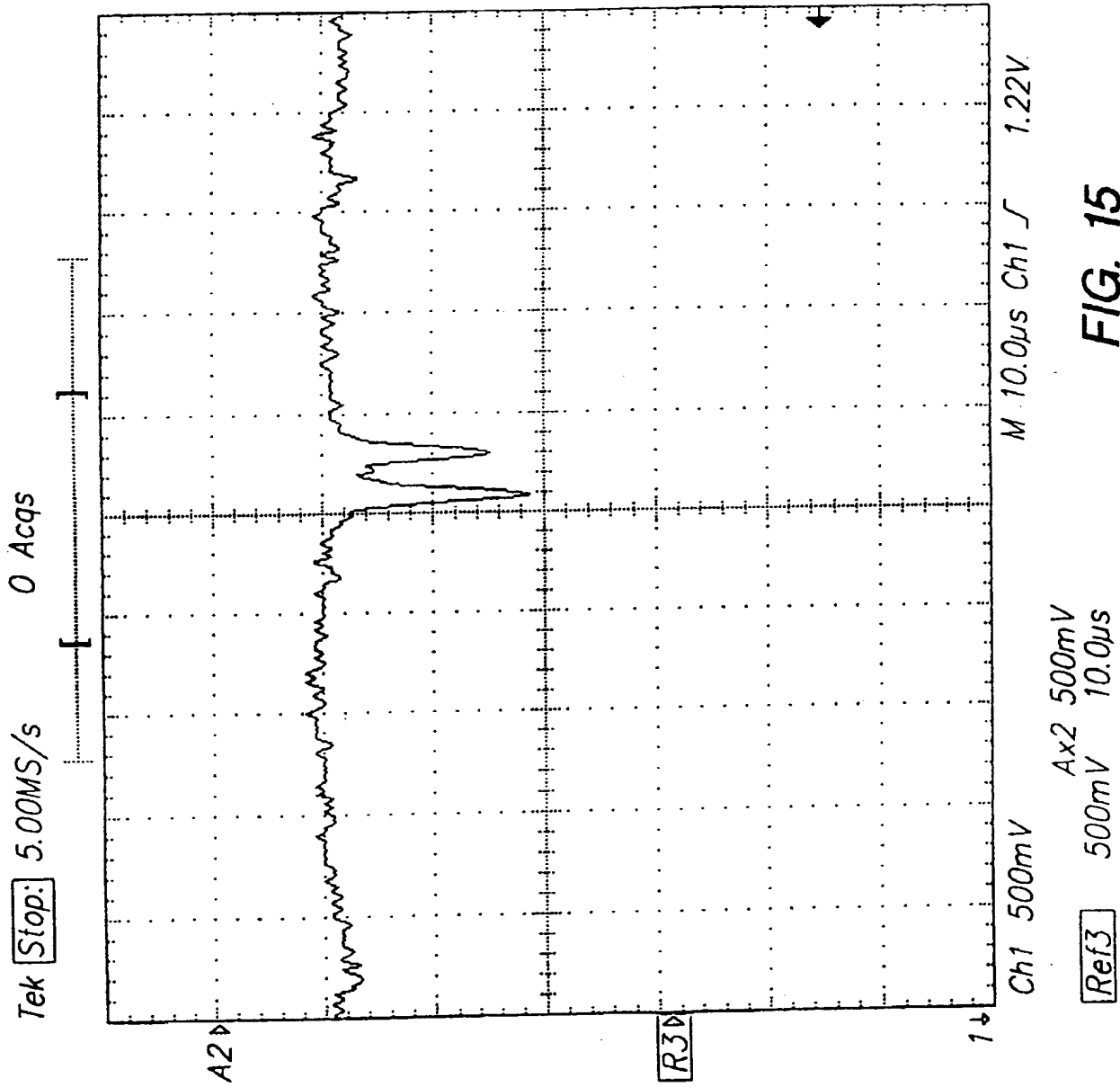


FIG. 14

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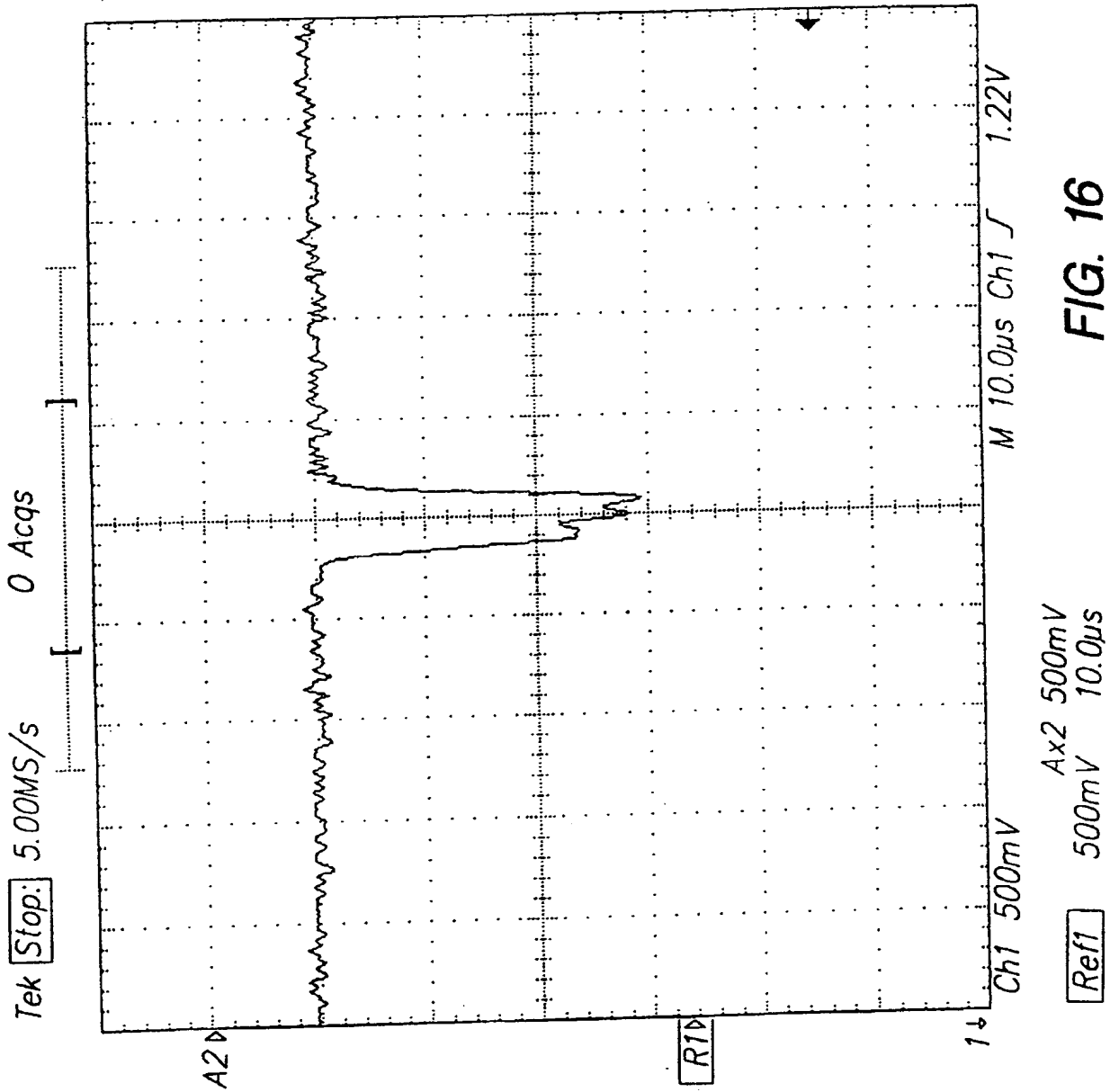
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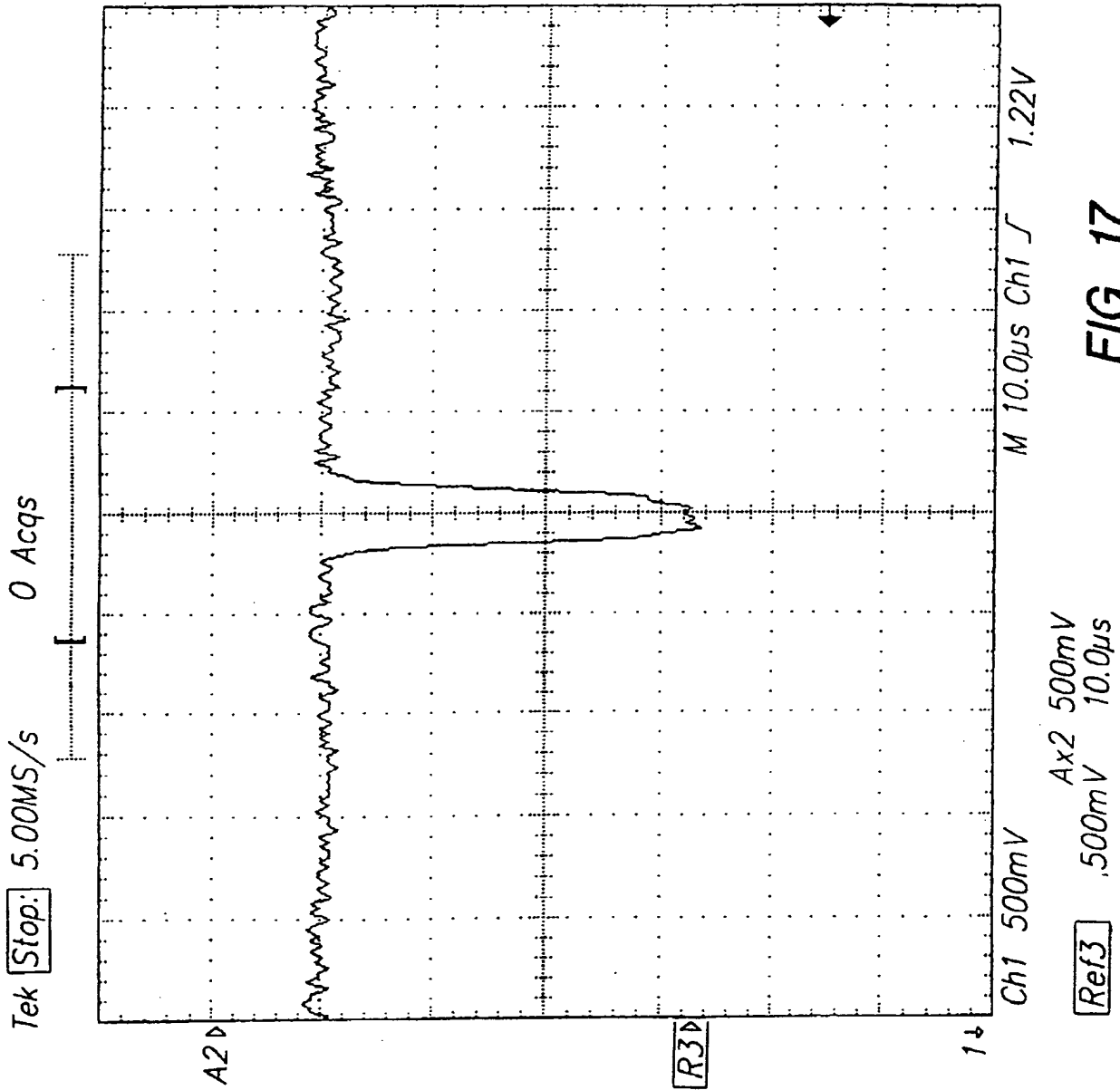


FIG. 17

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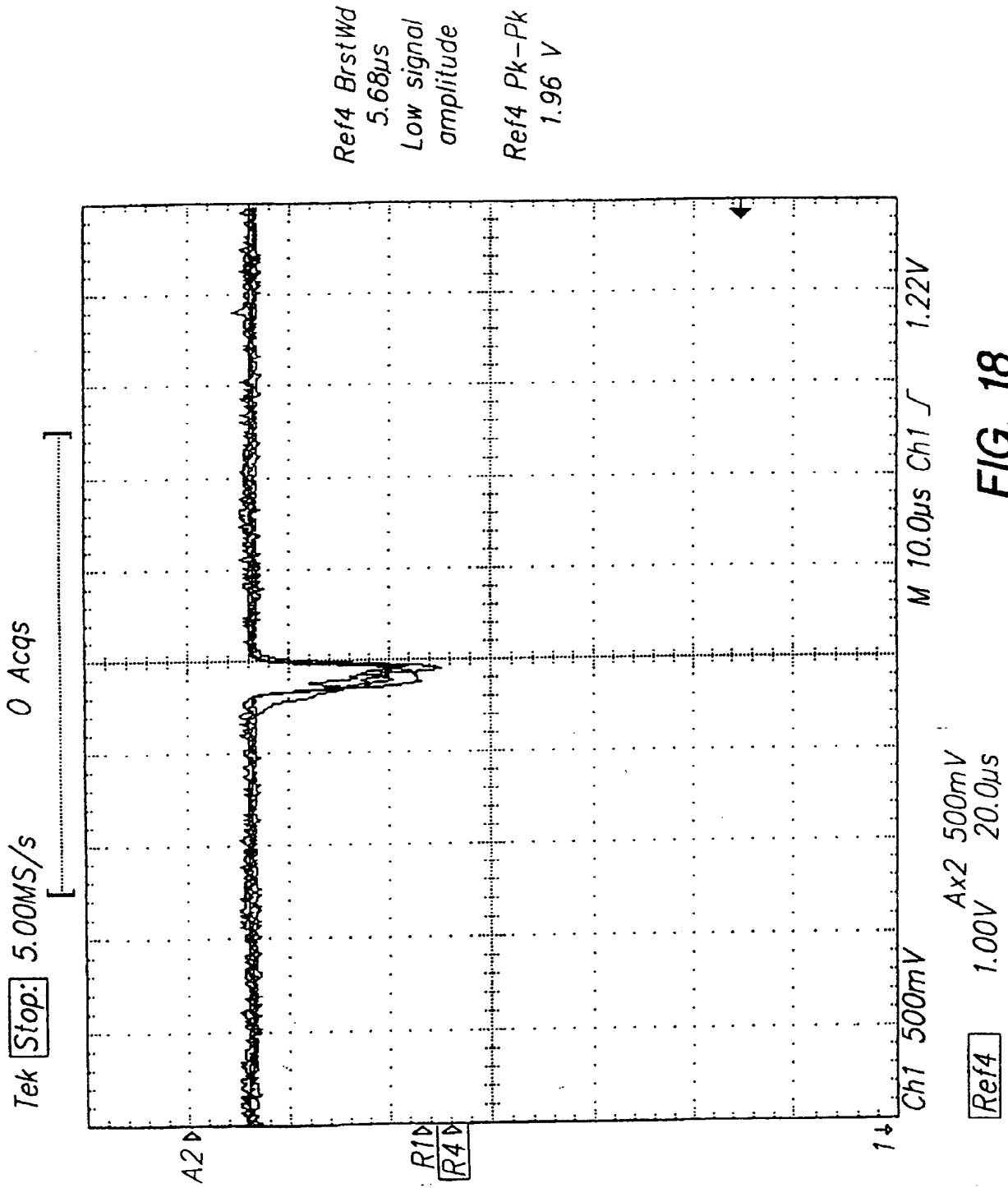


FIG. 18

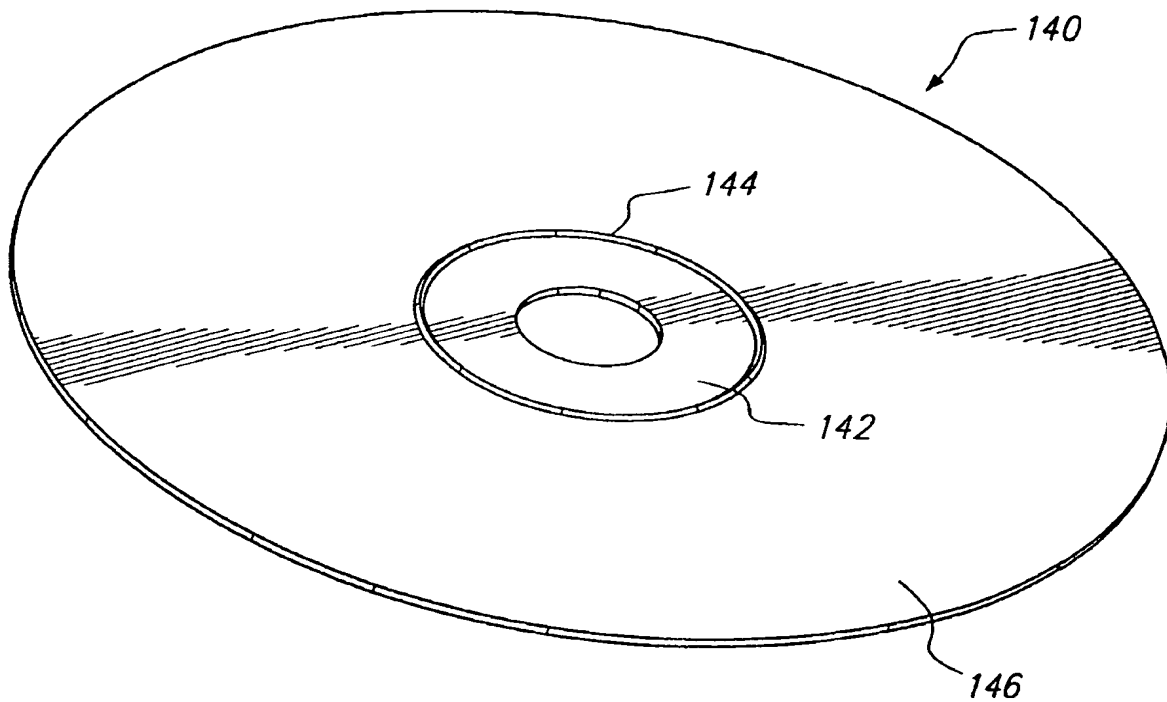


FIG. 35

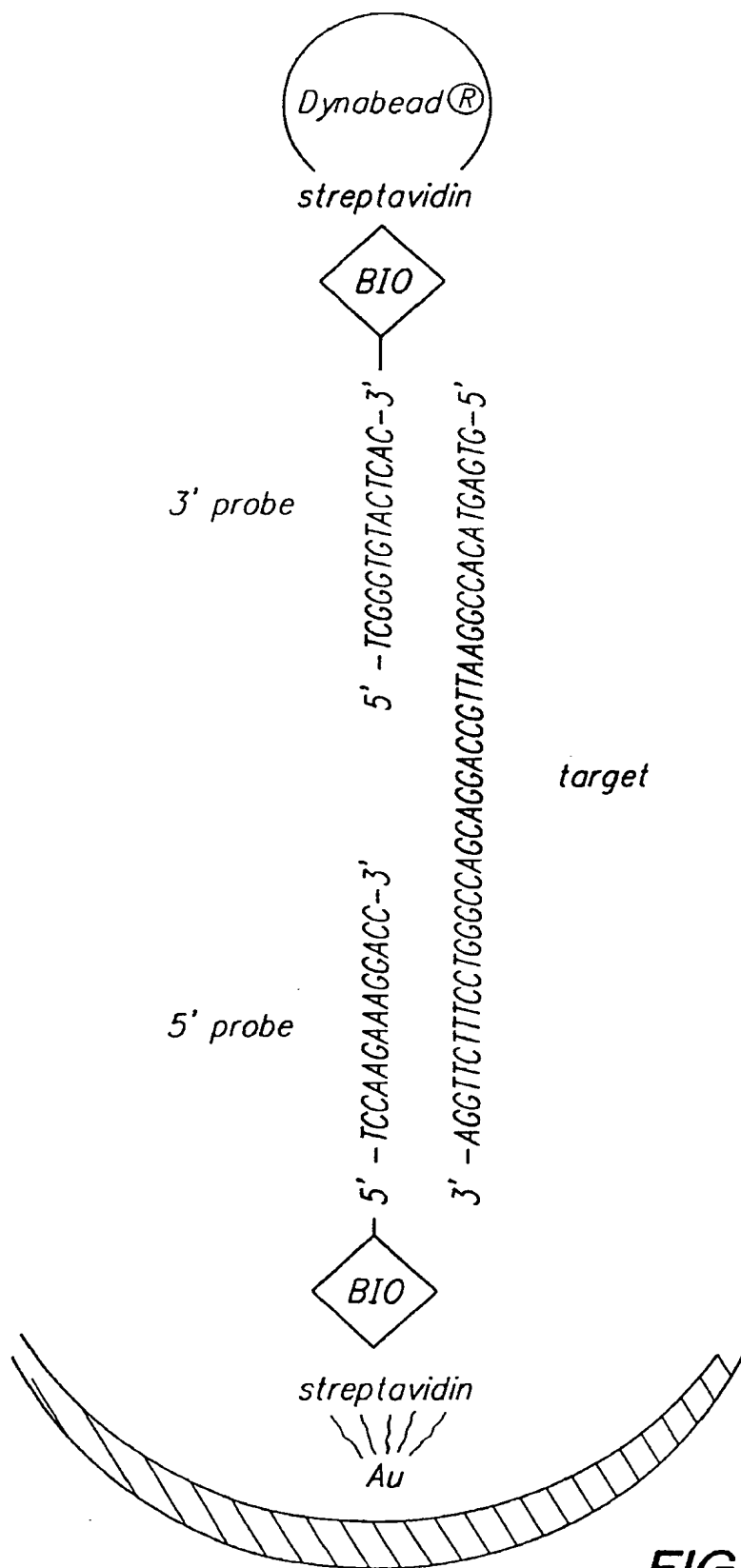


FIG. 36

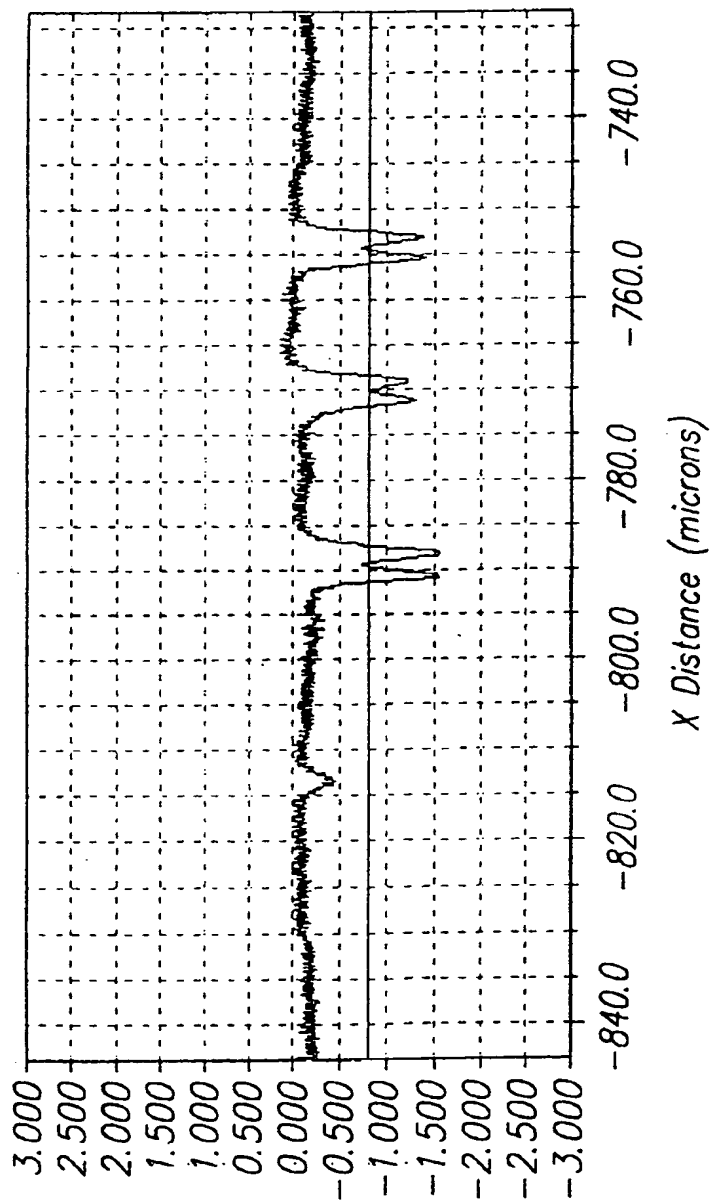


FIG. 40

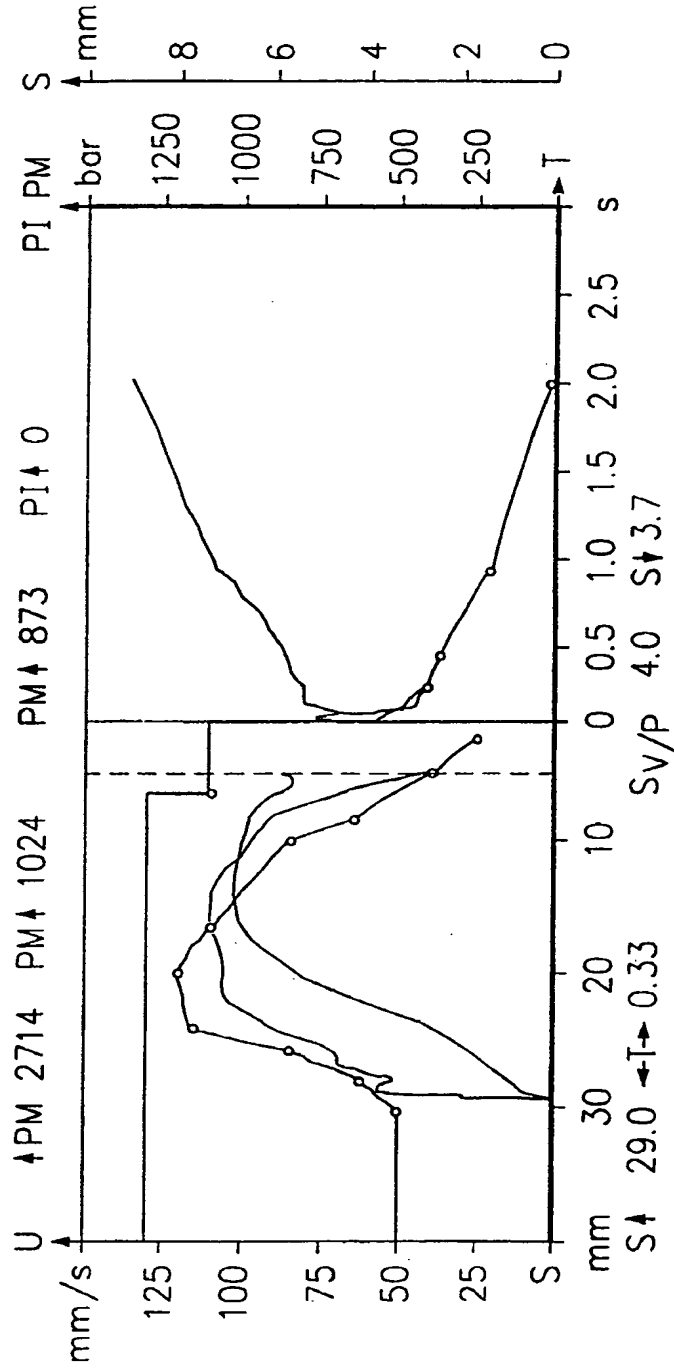
Supplementary sheet, mold acceptance test										CD-3-AWM							
AWM Muri		Job No		36-10236		Agent		CR-R		Ram hold		vac + mech		IFPI		Product Code No.	
SM Order No		9N.96293		Customer		Eximpo CS		Ram dia.		24						256	
<i>Dimensions</i>																	
0°=mold at top		R15		0°		90°		180°		270°		Visual faults				1/4 Center hole ✓	
<i>Thickness</i>		R40		1.15		1.155		1.15		1.15		Streaks				1/4 Stacking groove ✓	
				1.155		1.155		1.155		1.155						1/4 Info ✓	
Center hole 15.05+/-0.3		15.05		Drm. 120+/-0.3		mm						Clouds				1/2 ✓	
<i>Weight in g</i>		Min		0		15		30		45		Voids				1 ✓	
Measure every 15 min.		g		15.26		15.27		15.26		15.26		Black dots				3 ✓	
during test		g		15.26		15.26		15.26		15.26		Matt outer edge				3 ✓	
Max. diff±0.1 g				15.26		15.26		15.26		15.26		Burrs				3 ✓	
<i>Water in mold</i>																	
Sprue bush		ACTUAL		DESIRED		Tol.						Scratches				3 Center hole ✓	
Embosser		9		ltr./Min.		7		-1/+3				Diesel effect				3 Outer Edge ✓	
		6		ltr./MIN.		7		-1/+3				Brown Discoloration				5 ✓	
<i>Vacuum</i>																	
Handling		bar		without with diff.		tol.						Molding compound cold				1.462	
Ram		bar										Thickness of cavity (3)				0.33	
<i>Mold Function</i>																	
Embosser		✓		Raw material								Position of embosser (9)				0.876	
Sprue ejector		✓		Makrolon 2005		✓						Position of spure bush (10)				0.162	
Ejector sleeve		✓		Lexan 1020								Embossing stroke				0.7	
Sprue bush		✓		Panlite 5503													
<i>Air outlet</i>																	
FS dia.		✓										Measuring means				1	
BS dia.		✓										Polarized light				2	
												Halogen light				3	
												Neon Light				4	
												Black (UV Light)				5	
												White paper				6	
												Micrometer				7	
												Balance					

FIG. 41A

FIG. 41A

Graph 1. Injection - Holding pressure

Cycle illustrated: 533957
 Curve display: continuous



DVD_F50

FIG. 41B

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01.01 Mold movement				
Closing movement		Closing time	T32	= 000.
Pressure initiation	V33 =100%	S33 = 019.0mm		
	V34 =100%	S34 = 000.7mm		
Opening movement		Opening time	T36	= 000.
Braking	V41 =100%	S41 = 055.0mm		
	V42 =010%			
Pause time	T40 =000.000s	Mold position	S640	= 075.
Mold closing pressures				
Closing pressure	P682 =085%			
Pressure Build-up	P681 =020%	T681 = 000.10s		
C608 = 0 Switched off				
02.01 Summary of mold auxiliary controls/robotics				
Enable removal	T680 = 0065.0			
Delays				
Blow off sprue	T602 = 000.03	Sprue blowing time	T603	= 000.1
Advance ejector pin	T53 = 000.10s			
Transfer stroke forward	T55 = 000.12s			
Transfer Stroke return	T56 = 000.15s	Extend removal	T668	= 000.2
Embosser forward	T62 = 001.20s	Embosser return	T63	= 000.1
Blow on nozzle side	T75 = 000.50s	Nozzle side blowing time	T74	= 000.8
Blow on moving side	T671 = 000.00	Moving side blowing time	T71	= 000.1
Unit Forward	T680 = 000.70s			
Starting program	C683 = 00000	T683 = 000.00s	S683	= 0004.
Cyle time	T11 = 009.05s			
Removal time	T640 = 000.70s			

FIG. 41C

03.01 Metering				
Screw retraction	C17 = 0	Switched off		
Metering Delay	T20 = 000.50 s	Metering time	T21 = 005.9	
Metering stages	C124 = 2			
Metering end point	S23 = 026.0 mm S24 = 029.0 mm	P23 = 0060 bar P24 = 0010 bar	N23 = 100 1. N24 = 020 1.	
Holding pressure	P27 = 0010 bar	Start of injection	S0 = 029.0	
04.01 Injection				
Enable injection	S682 = 0002.0 mm	Screw position	S641 = 029.0	
Injection values	C121 = 10 V196 = 0050 mm/s V197 = 0062 mm/s V198 = 0085 mm/s V199 = 0115 mm/s V200 = 0120 mm/s V201 = 0110 mm/s V202 = 0085 mm/s V203 = 0065 mm/s V204 = 0040 mm/s V205 = 0025 mm/s	Start of injection S196 = 030.0 mm S197 = 027.6 mm S198 = 025.6 mm S199 = 024.0 mm S200 = 019.8 mm S201 = 016.2 mm S202 = 009.5 mm S203 = 008.0 mm S204 = 004.0 mm S205 = 001.5 mm V/P changeover point	S0 = 029.0 T2 = 000.3 S11 = 004.0	
Enable V/P changeover Forcible changeover				
Flow number	S121 = 018.2 mm	S122 = 015.0 mm	C125 = 2776	
Pressure monitoring		Peak pressure	P125 = 01044	
First stage	P101 = 01300 bar	T201 = 00.02 s		
Second stage	P102 = 01100 bar	T201 = 00.02 s	S102 = 006.0	

FIG. 41D

04.02 Holding pressure, cooling				
Holding pressure values	C122 = 04 P12 = 00550 bar	Changeover point	S11 =	004.0
Holding pressure time	P117 = 00420 bar P118 = 00380 bar P119 = 00200 bar	T117 = 000.20 T118 = 000.40 T119 = 000.90 T120 = 002.00		
Cooling time	T39 = 005.30 s			
Melt cushion monitoring				
Upper limit	S219 = 010.0 MM	Melt cushion Lower limit	S19 = S119 =	003.7 000.5
05.01 Nozzles, unit, purging/dry cycles				
Standstill monitoring	C606 = 60 min	C640 =	0004 min	
Unit				
Unit forward	T680 = 000.70 s	V29 =	030 %	
Lift	T30 = 000.30 s	V30 =	050 %	
Unit set-up and manual movements				
Move forward	V816 = 030 %	Lift V806 =	030 %	
Purge/dry cycle/clean				
Number of metering strokes	C16 = 20	C201 =	50	
Metering	S16 = 028.0 mm	P16 =	0060 bar	N16 = 200
Injection	S18 = 001.5 mm	V101 =	05 mm/s	
Delay for purging	T606 = 000.00 s			

FIG. 41E

06.01 Temperature control, plastifier zones/temperature control devices						
Zone/description	Set point	Actual value	Reduced	Tolerance	Heating outputs	Cooling
10 Melt temperature	310° C	305° C	180° C	040° C	040° C	
30 Nozzle	330° C	330° C	180° C	040° C	014%	
13 Nozzle	315° C	315° C	180° C	040° C	025%	
Cylinder head	310° C	310° C	180° C	040° C	008%	
15 Compression	305° C	305° C	180° C	040° C	005%	
16 Compression	305° C	308° C	180° C	040° C	006%	
18 Feed	300° C	295° C	180° C	040° C	070%	
20 Inlet	060° C	060° C	060° C	040° C	040° C	024
Zone/description	Set point	Actual value	Reduced	Tolerance	Heating outputs	Cooling
24 Heating/cooling device	112° C	093° C	050° C	020° C	020° C	000
25 Heating/cooling device	114° C	091° C	050° C	040° C	020° C	000
08.01 Disk transfer						
Peripheral interface	C684 =	0	Without signal acknowledgement			
Buffer switch-off size	C680 =	65000				
Production delay	T682 =	001.00 s				
Max. transfer time	T601 =	001.00 s	C605 =	0	With interruption of cycle	

FIG. 41F

09.01 Production control									
Application		C340 = 2		No application					
Data set number		C315 = 100							
Production sequence									
Item number		C303 = 1		Piece counter		C324 = 29270			
Cycle time		T11 = 009.05 s		Cycle counter		C325 = 29270			
Production preparation				Failure rate		C718 = 30.56%			
				Reason		C357 = 00			
10.01 Process statistics									
Q monitoring		C340 = 2		Monitoring without screening out					
Q report		C700 = 0		No report					
Total		cycles of which		out of tolerance		failure rate			
Random sample		C325 = 29270		C318 = 8946		C718 = 30.56%			
		C326 = 29269		C338 = 8946		C738 = 30.56%			
Process variables		Set Point	Tolerance	Actual Value	Mean	Scatter	Out of Tolerance		
		x	+/-	x	xq	3s			
Metering time		1.20	0.30	5.98 s	2.32	5.408	-06786		
Injection start		30.1	2.0	29.0 mm	28.6	0.82	2028		
Injection time		0.47	0.20	0.33s	0.39	0.105	0		
V/P changeover point		3.5	1.0	4.0 mm	4.0	0.04	0		
Melt cushion		4.2	1.0	3.7 mm	3.8	0.25	0		
? peak value		600	200	871 bar	682	99.9	-06566		
? peak value		0		0 bar	0	0.0			
Flow number		2500	300	2776	2441	99.9	359		
Cycle time		3.90	0.50	9.05 s	5.08	6.421	-06570		

FIG

FIG. 41G

10.02 Configuration of the quality monitoring

Reaction: Process data outside tolerance
 Switch-off behavior C703=0 no reaction

10.03 Q report intermediate store

Manufacturer
 Machine No. DVD_F50
 Job data

FIG. 41H

16.01 System characteristics

Machine data	DISCJET 600/110	Order number	DVD_F50		
Machine type	PAC 13.54	IMC 12.26	CEL 10.31		
Control version	DB 05.80	Date created	23.10.1996		
Database version	350400	Version	17106		
Special					
Mold data					
Installed height	S90 = 160 mm				
Plasticizing	Identification	C806 =	024		
Ram nominal diameter	S801 =	032.0 mm			
Max. permissible melt pressure	PB00=01482 bar				
Max. permissible backpressure	P801 =	0317 bar			
Temperatures	Set point/actual value				
Cabinet	TH1 = 035 026° C				
Oil	TH2 = 050 051° C				
	Tolerance -/+				
	030° C 010° C				
	041° C 011° C				
	Heating				
	000%				
	Cooling				
	005				
	Max metering stroke				
	Max. specific melt pressure				
	C804 =	00%			
	S802 =	100%			
	P802 =	01482 bar			

FIG. 41I